PRO-ACT
A Base-level Pollution Prevention Resource sponsored by HQ Air Force Center for Environmental Excellence

SUCCESS STORY

SPOTLIGHT ON: McCLELLAN AFB - OCTOBER 1998

Introduction

The United States Air Force recognizes the importance of pollution prevention (P2) in protecting the environment, achieving compliance objectives, and reducing waste disposal costs. Successful P2 programs, including recycling, hazardous materials minimization, product substitution, and process changes, among other strategies, are planned or underway at Air Force installations worldwide. The Air Force's environmental programs must do more today than ever before, and do it with increased cost-effectiveness.

The Air Force is a leader in fostering environmental awareness and education within its work force and communities, thereby extending environmental stewardship from a management concept to an individual responsibility. In response to executive orders, regulations, and policies, successful P2 strategies and technologies are continuously being developed, applied, and improved at Air Force bases around the world. As new ways emerge to eliminate compliance burdens, save money, and minimize chemical exposures, the Air Force is committed to collecting these P2 success stories and making them available to Air Force activities everywhere.

Background on McClellan AFB

McClellan AFB is one of the largest industrial employers in Northern California and has been an active industrial facility since 1936. As host to one of five Air Logistics Centers (ALCs) in Air Force Materiel Command (AFMC), approximately 12,000 military and civilian personnel are employed at McClellan AFB repairing and maintaining aircraft, space, and communication equipment. Other program areas include advanced electronics, fiber optics, advanced composites, and neutron radiography. These missions require large volumes of hazardous materials such as solvents, caustic cleaners, electroplating chemicals, heavy metals, low level radioactive wastes, and a variety of fuels, oils, and lubricants. There are more than 450 waste streams, 250 hazardous waste generation points, 43 satellite accumulation points, and a Resource Conservation and Recovery Act (RCRA) Part B permitted storage facility on the installation. Additionally, the base manages 20 tiered permits.

McClellan AFB Success Stories

In 1985, McClellan established the first Environmental Management (EM) Directorate in the Department of Defense (DoD). The EM Directorate features a dedicated environmental team of more than 100 people, all with strong environmental ethics and vision.

One component of McClellan's EM Directorate is the Pollution Prevention Division, which oversees projects designed to reduce the use of hazardous materials and the release of pollutants to the environment. The P2 Program is conducted and managed according to a P2 Management Action Plan (MAP3) that relies on four management tools: 1) an Economic and Evaluation Comparison Model; 2) a Prioritization Model; 3) a Users Tracking Tool System; and 4) Road Maps. The success of the program can be easily gleaned from the following metrics: hazardous waste disposal has been reduced by 82% since 1985; solid waste disposal has been reduced by over 4,000 tons per year over the last three years; use of Ozone Depleting Substances (ODSs) has been reduced 98% from a January 1992 baseline; and EPA-17 chemical usage is down 75% since 1992.

McClellan AFB views pollution prevention as its best approach to achieving environmental compliance. Integrating pollution prevention with compliance has enabled the base to simultaneously improve its compliance record, as well as the effectiveness of its industrial operations.

In 1995, McClellan AFB was selected by the United States Environmental Protection Agency (EPA) as one of 12 facilities in the nation (ten private sector and two federal) to participate in their Environmental Leadership Program (ELP). This program identified and drew upon the expertise of "top performers" in environmental compliance and pollution prevention, thereby establishing a long-term environmental leadership program. The ELP is designed to explore ways to reduce the risk of noncompliance through pollution prevention practices. McClellan AFB is helping to set the course for others interested in following the base's leadership, principles, and actions.

The following is a selected listing, including descriptions, discussions, and benefits, of successful pollution prevention efforts implemented at McClellan AFB. Also included are the names and telephone numbers of persons to contact for more information.

McClellan AFB P2 Success Stories

Rock Crusher Recycles Waste Concrete

Description: A rock crusher is being used to recycle concrete demolition debris into usable aggregate suitable for concrete, fill material and road base-course (the gravel foundation on which a road is built), thereby reducing the costs associated with the transportation of construction debris to a landfill.

Discussion: McClellan AFB has purchased a rock crusher to recycle concrete demolition debris into reusable aggregate. The rock crusher was purchased for $750,000 and an additional $200,000 was spent on a year-long operating contract. The new rock crusher also separates metal reinforcing bars from the debris for recycling as a separate commodity. According to the manufacturer of the rock crusher, concrete made from recycled aggregate exceeds most State construction specifications.

Benefits: Use of the rock crusher saves the purchase price of construction aggregates and fill. In addition, the separated metal reinforcing bars can be recycled, further offsetting costs. Use of the rock crusher has allowed McClellan to avoid paying approximately $3.8 million to haul 144,000 tons of construction debris to a landfill. Further, in only its first three months of operation, the rock crusher generated aggregate that would have cost the base $331,350 to purchase. As concrete demolition debris continues to be generated, the rock crusher continues to generate savings long after the purchase price was fully recovered.

For More Information: Contact Gerald Vincent, SM-ALC/EMRO, (916) 643-3672 ext. 447.

Aqueous-based Parts Washer

Description: An older solvent-based parts washer (SPW) was replaced with a larger capacity aqueous-based parts washer (APW).

Discussion: The Aircraft Landing Gear shop works on landing gear assemblies for aircraft undergoing depot level maintenance at McClellan AFB. The shop recently replaced an older SPW used to clean bearings and other components with a new APW. The old SPW required an air emissions permit to operate due to the release of volatile organic compounds (VOCs). Such permits were becoming difficult to obtain due to the age of the SPW. The new APW does not use solvents, nor does it require an operating permit for air emissions. The APW also has a larger capacity than the old SPW.

Benefits: The elimination of the permit required for the old SPW reduces the associated compliance liability. In addition, since the APW has a larger capacity than the SPW, larger parts, such as skin panels handled by other functions located in the same facility, can be washed; thereby expanding the use of the new unit. Finally, because there are no solvents or hazardous substances involved in the parts washing process with the new APW, less personal protective equipment (PPE) is required for operators and the parts can be handled directly from the washer without requiring further cleaning.

For More Information: Contact Alan Rockswold, SM-ALC/EMO, (916) 643-3672 ext. 465.

"Head-End" Waste Treatment Stations

Description: Treatment of hazardous waste at the source (i.e., "head-end" treatment) was implemented at McClellan AFB as a way to eliminate the discharge of hazardous waste into the Industrial Waste Lines (IWLs) that lead to the on-base Industrial Waste Treatment Plant (IWTP).

Discussion: McClellan AFB had flushed waste, including hazardous waste, from its industrial processes into the IWLs for many years. The IWLs transported wastewater to McClellan's IWTP for treatment before discharge to the Sacramento County sanitary sewer system. The base set a goal to eliminate all hazardous discharges to the IWLs and the IWTP. This goal was reached, in part, through the implementation of head-end treatment. The IWLs are now used to transport only "sewerable" wastewater. Head-end treatment and industrial process changes have made the main IWTP unnecessary.

Historically, the IWLs transported approximately 500,000 gallons per day (gpd) of wastewater from over 200 separate processes, including painting, cleaning, and flight line operations. Data indicated there were approximately 24 major processes discharging many different hazardous substances into the IWLs. To allow for closure of the lines to hazardous discharges, McClellan changed processes, eliminated or substituted chemicals, and began treating wastewaters at their source. An example of one new head-end treatment strategy is rinsewater recycling, which eliminated approximately 50,000 gpd of hazardous wastewater from McClellan's plating shop operations alone. Waste rinsewater from plating shop operations is now treated on site. The waterfall paint and plasma spray booths now use microseparators, which separate solids, including particulate matter, from the waste rinsewater. Solids are disposed of as hazardous waste, and the rinsewater is recycled.

Benefits: As a result of implementing an aggressive program of head-end treatment, industrial process changes, and elimination or substitution of hazardous chemicals, McClellan AFB was able to eliminate the transport and treatment of all hazardous wastes through the IWLs. The program has been so successful that the main IWTP is no longer required to handle hazardous wastes. The cost savings alone from these changes are expected to be substantial. Head-end treatment has also eliminated the environmental liabilities and risks associated with potential unauthorized releases of hazardous substances from IWLs and the IWTP.

For More Information: Contact John Carroz, SM-ALC/EMPW, (916) 643-3672 ext. 356.

Just-in-Time Delivery and Unit-of-Use Packaging

Description: Implementation of just-in-time delivery and unit-of-use packaging at McClellan is effectively reducing material and storage costs, as well as reducing hazardous material generation.

Discussion: The McClellan AFB Hazardous Material Support Center (HMSC) manages, coordinates, and controls the issue and requisition of hazardous materials (HAZMAT). Just-in-time delivery means materials are procured for use very close to the time needed, thereby reducing costs associated with the maintenance of hazardous supply materials at the user's facility. Unit-of-use packaging means that materials are packaged in smaller quantities as required to perform a single operation, thereby reducing costs associated with storing and managing the used/waste materials.

In the past, aircraft maintenance and repair activities purchased primer paint in quart or gallon units of issue, the only option available through the General Services Administration (GSA). The primer used most often consisted of two substances that had to be mixed and used within two hours, often resulting in excess primer being disposed of as a hazardous waste. Personnel were also required to wear personal protective equipment when mixing the two compounds. Spills often occurred as the paint was transferred into smaller containers for individual use.

In 1996, the Base requested that the paint vendor package the primer in 3-ounce kits. The company cooperated, and the kits were GSA stock-listed. The Base now uses the 3-ounce kits frequently as it provides adequate paint for most touch-up jobs.

Benefits: Hazardous materials are procured for use only when they are needed, and in only the quantity needed for the job. This has reduced the potential for spills and has eliminated the labor-intensive process of mixing and decanting from larger containers. Furthermore, a much smaller inventory is maintained, products seldom exceed shelf life, and the quantity of hazardous waste is drastically reduced. The HAZMAT inventory at McClellan AFB has been reduced from $3.2 million (3,500 stock listed items) in 1993 to $414,000 (1,570 stock listed items) in 1997. Combining forces with GSA and the paint vendor, McClellan AFB saved over $26,000 in disposal costs for waste materials through just-in-time delivery and unit-of-use packaging.

For More Information: Contact Mari-Ann Wiedig, SM-ALC/EMPM-1, 916-643-1687.

Air Force Center of Excellence for Electric Vehicles (EVs)

Description: McClellan AFB continues its pioneering role in the use of electric vehicles in Federal fleet operations. Today, the installation has the most advanced electric vehicle (EV) fleet of its kind within the DoD, and the largest single operational fleet of EVs (100+) in the nation, logging over 8,000 emission-free miles monthly.

Discussion: McClellan AFB received the 1997 National Renew America Award for Environmental Sustainability for Transportation Efficiency as a result of these efforts. As the Center of Excellence for EVs, McClellan AFB provides leadership in the authoring of DoD procurement specifications, conducts first article inspections, identifies and evaluates infrastructure requirements, conducts studies and tests of emerging technologies, and provides expert consulting services to Federal groups. In addition to the EV fleet, McClellan AFB operates a fleet of over 60 compressed natural gas (CNG) vehicles that can fulfill missions that EVs cannot, while still providing environmental and economic benefits over gasoline and diesel powered vehicles.

Benefits: The base estimates that their EV fleet avoids the placement of 170,000 lbs. of pollutants into the air each year. This is particularly important as the base resides in Sacramento, CA; a region classified as a severe air quality nonattainment area by the EPA. The EVs are also very energy efficient, and on average, obtain 66 miles per equivalent gallon of gasoline.

For more information: Contact Philip Mook, SM-ALC/EMRP, (916) 643-3672 ext. 327.

Rideshare Program

Description: As Sacramento's largest employer, McClellan AFB accepts its responsibility to improve air quality. It also recognizes that over 70% of the region's air pollution is from motorized vehicles.

Discussion: Through innovative projects, McClellan AFB's Rideshare Program has reduced the percentage of solo drivers from 77% in 1994 to 62% in 1997. This program targets employee education, carpooling, vanpooling, bicycling, use of public transportation, clean-fueled vehicles, and miscellaneous transportation modes (walking, jogging, roller blading, etc.). The program's groundbreaking Air Force efforts include: free use of Sacramento public transportation open to all McClellan AFB employees, $25 per person subsidy of vanpool lease expenses, installation of an automated bicycle-only gate in a "friendly" location, and making a reflective vest available to all base bicycle commuters. Other programs include preferential parking for carpools and support of the Security Police Bicycle Patrol.

Benefits: According to the California Department of Transportation, for every McClellan AFB employee that uses a non-motorized mode of transportation, approximately 200 lbs. of air pollutants are avoided each year. Therefore, the 1,000 commuter vehicles that the Rideshare Program keeps off Sacramento streets and highways result in a net reduction of 200,000 lbs. of air pollutants per year.

For more information: Contact Rebecca Garrison, (916) 643-0931 ext. 7 or John Carroz, SM-ALC/EMPW, (916) 643-3672 ext. 356.

Pilot Foundry

Description: The Casting Emission Reduction Program (CERP) is an ongoing, five-year "Dual-Use" initiative between McClellan AFB and the private sector with the objective of developing cleaner and more efficient metal casting processes in compliance with Clean Air Act requirements.

Discussion: The CERP is one of the largest and most successful examples of "Dual-Use" where a national problem gets solved, the military mission is met, and a world class commercial capability is made available for leveraging other base closure manufacturing enterprises. The initial objective is to develop new materials, processes, or equipment for metalcasting manufacturing that will achieve a near-zero effect on the environment while producing high quality military components.

FY 94 and FY 95 funds were used to develop test protocols and to train the emission test team. The emission test team conducted preliminary training and tests at Ford, Chrysler, General Motors, and Caterpillar foundries. FY 96 and FY 97 funds were used to conduct iron casting baseline measurements at the pilot foundry, as well as at DoD and commercial foundries. This "stack testing" effort represents the largest military or civilian effort to characterize an industry. It includes military as well as private sector foundries and plays a large part in shaping the development of the Federal Clean Air Act's National Emissions Standards for Hazardous Air Pollutants (NESHAPs) MACT standard for the year 2000. The Foundry of the Future is located in Bldg. 238, a 60,200 square foot existing facility at McClellan

AFB. The design provides for the testing and prototyping of new gray iron, ductile iron, and aluminum processes and materials. The pilot foundry has the unique ability to isolate process emission streams for analysis and will have state-of-the-art production control and monitoring systems.

Benefits: The pilot foundry is a true Dual-Use facility since, in addition to process and material experimentation, the foundry can support DoD specialized casting needs. The hardware needs of the military post-2000 will depend on manufacturing technologies that either do not exist today or, if they do exist, are unable to bridge the gap between the lab bench and the shop floor. The CERP provides the country with the ability to launch lighter weight castings more quickly, and at the same time meet the more demanding environmental regulations of the Clean Air Act.
For more information: Contact William Walden, Manufacturing and Service Division, SM-ALC/LIM, (916) 643-1090.

Other McClellan Success Stories

Relocation of SVE Systems

Description: In order to make optimal use of mobile soil vapor extraction (SVE) treatment units that have served out their purpose, McClellan is moving them to different locations on Base to be reused as part of other SVE systems for which they are more suitable.

SVE is a process of extracting volatilized contaminants (solvents and fuels) from subsurface soils under negative pressure for treatment. Four SVE systems are in place and operating at different areas on McClellan AFB. Different SVE treatment units work best with different concentrations and types of contaminants. For example, one SVE treatment unit, called catalytic oxidation, is operated more cost effectively when used to treat soil vapors with high contaminant concentrations. As contaminants are extracted from the soil, their concentrations in the extracted vapors decrease. Once the contaminant concentrations in soil vapors fall below a certain level in the area of a particular SVE system, a treatment unit using activated charcoal filters is more cost effective to operate. Therefore, the installation implemented a program where SVE treatment units are moved to locations where they can operate most effectively, based on the contaminant concentrations in the soil vapors at a particular location. The strategy of SVE treatment unit relocation at McClellan is intended to make the most cost-effective use of the various treatment units on base.

Benefits: As a soil remediation technology, SVE has proven to be very successful at McClellan AFB. Reusing the existing treatment systems by moving them to more cost-effective locations will save about $3 million over the next few years. The use of smaller, mobile SVE treatment units (instead of large, stationary units) allows the Base to move them wherever they are most needed and saves money over the higher cost of larger, stationary units.

For More Information: Contact Steven Mayer, SM-ALC/EMRP, (916) 643-3672 ext. 320.

Multiphase Extraction System

Description: Multiphase extraction, a remediation technology that extracts both contaminated soil vapor and contaminated groundwater from the subsurface, has been tested at McClellan AFB with promising results.

Discussion: McClellan AFB has evaluated several innovative and conventional technologies for the extraction and treatment of volatile organic compounds (VOCs) in soil and groundwater. The testing of multiphase extraction systems at McClellan AFB has included the high-vacuum Xerox “2-Phase” extraction system, the high-vacuum “dual phase” extraction (HVDPE) system, and the low-vacuum “dual phase” extraction (LVDPE) system.

The “2-Phase” extraction system uses a high pressure vacuum, generally 457 to 737 millimeters of mercury (mm/Hg), to withdraw groundwater from an extraction well. The well is screened in the contaminated groundwater zone and the patented extraction tube is placed at the air-water interface within the well casing. The high vacuum entrains groundwater in an air-water mixture that passes up the extraction tube to the surface, where it passes through an air-water separator (AWS). The turbulent conditions in this extraction system cause volatile organic compounds in the groundwater to be transferred to the air phase of the air-water mixture being extracted through the tube. While the system effectively transfers most of the VOCs to the air phase from the extracted groundwater, treatment of the groundwater is typically required to meet surface water discharge limits. “2-Phase” extraction is very effective under two specific circumstances: when the aquifer, or groundwater formation, yields very low amounts of water (less than 10 liters per minute [L/min]) and when the contaminated portion of the aquifer is less than about 30 meters below ground surface (bgs). At

depths of over 33 meters bgs, the energy costs of "vacuuming" the groundwater increase substantially. Due to the typical depths to groundwater found at the base, the Xerox "2-Phase" system has limited applicability at McClellan AFB.

"Dual phase" extraction systems combine two conventional technologies, soil vapor extraction and groundwater extraction, in a single well. The well is constructed so that the screen intercepts the contaminated portions of both the aquifer and the overlying unsaturated soil. "Dual phase" extraction uses a submersible pump to remove groundwater from the well while using a separate system to extract vapors entering the well from the unsaturated soil zone. "Dual phase" extraction systems are appropriate where substantial amounts of contamination remain in the unsaturated zone. The HVDPE (high-vacuum) system can increase groundwater production significantly in clay, silt, and clayey silt formations. LVDPE (low-vacuum) systems are best suited to silty sand and sandy silt formations.

Benefits: Multiphase extraction conducted at actual sites on McClellan AFB has demonstrated a significant degree of cost-effectiveness over traditional pump and treat methods. The results of McClellan's innovative technology testing have been used by the EPA to establish presumptive remedy criteria for multiphase extraction systems nationwide. Each extraction system has been shown to have a unique application. At McClellan AFB, HVDPE is most effective when used in low permeability aquifers with conventional yields between 3.7 and 19 L/min. LVDPE systems tend to be most cost-effective for formations with conventional groundwater yields of 19 to 35 L/min. When maximum well yields are greater than 35 L/min, conventional extraction wells become less expensive to operate. Practical experience has shown that because of the depth to groundwater at McClellan AFB, "2-Phase" extraction is only appropriate in areas with extremely low permeabilities, e.g., conventional groundwater yields of less than 4 L/min.

For More Information: Contact Capt George Joyce, SM-ALC/EMRP, (916) 643-3672 ext. 443.

The AFCEE Team - Recognized as a customer-oriented leader and the preferred provider of environmental, planning, design, and construction services.

Pollution Prevention Success Story - TI 18402 - OCTOBER 1998

Need more information? Contact PRO-ACT at DSN 240-4214, (800) 233-4356, or **http://www.afcee.brooks.af.mil/pro-act**.

Printed on Recycled Paper